# ORIGINAL ARTICLES

## ASSESSMENT OF DETERMINANTS OF PRACTICES REGARDING USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) AMONG MEDICAL STUDENTS

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## ABSTRACT

***Objective:*** To assess the knowledge, attitudes regarding hygienic and personal protective practices and to evaluate the factors associated with the knowledge regarding use of PPE among medical college students.

***Study Design:*** A descriptive cross-sectional study.

***Place and Duration of Study:*** Foundation University, Islamabad Pakistan, from Mar to May 2021.

***Methodology:*** Using non-probability consecutive sampling, a self-administered questionnaire will be given to students. Questions will be asked about their knowledge of the types of PPE and its correct use and analyzed in SPSS-20.

***Results:*** Out of 289 respondents, one hundred and sixty-eight (58%) belongs to 1st - 3rd year of MBBS and one hundred and twenty-one (42%) were in 4th and final year. Majority (68%) were females and ninety-two (32%) males. Two hundred and forty-three (84%) of them agreed that main goal of infection control is to prevent infection among patients and health care workers. Two hundred and twenty-eight (79%) of them had knowledge regarding correct duration of hand washing and ninety-eight (34%) agreed that use of gloves replaced the need of hand washing. More than half (78%) had knowledge that hand washing is indicated after removal of gloves. Majority (92%) knows that PPE provides barrier against infection. About half (53%) and (48%) had correct knowledge regarding donning and doffing of PPE respectively. Regarding attitudes, half of the respondent (50%) strongly agrees towrds correct use of PPE and hand hygiene.

***Conclusion:*** The levels of self-reported PPE information and Infection prevention and control training are sub-optimal in medical students of FFH which significantly correlates to COVID-19 and other infectious diseases-related anxiety.

**Keywords:** determinants, practices, personal protective equipment's.

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## INTRODUCTION

Health care professionals and patients are at high risk to be exposed to potentially infected blood and body fluids that can lead to serious or even lethal infections.[1] These infections can be minimized by use of standard precautions including personal protective equipment (PPE).[2]

Numerous studies have shown that factors that contribute to non-compliance with standard precautions include lack of understanding and knowledge among health care workers on how to properly use protective barriers, lack of time, lack of resources, and lack of proper training. The previous studies also suggest that medical students may not receive adequate training in infection control practices such as hand hygiene and standard precautions.[3] Many young doctors and interns feels that they have insufficient knowledge and practical expertise regarding correct use of PPE,[4] which lead to an unmet need for teaching undergraduates about its importance[5].

Ideally, training in the use of PPE and other infection control practices should be included in the medical college curriculum.[6] Practical PPE skills are not always properly evaluated at undergraduate level and are often learnt during the clinical rotations.[7] Delays in practice can lead to an increased risk for contamination of skin and clothing with healthcare-associated pathogens.[8] Mostly students and interns are influenced by the PPE practices of senior registrars and consultants and it can lead to sub optimal practices.[9] The importance of use and correct use of PPE is much more these days in view of the current pandemic of COVID-19.

When new respiratory infectious diseases become widespread, such as during the COVID-19 pandemic, healthcare workers' adherence to infection prevention and a control (IPC) guideline becomes even more important.[10]

Strategies in these guidelines include the use of personal protective equipment (PPE) such as masks, face shields, gloves and gowns; the separation of patients with respiratory infections from others; and stricter cleaning routines.[11,12] This study was conducted to know the knowledge and attitude of the medical

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students in our setup regarding the proper use of PPE so that some recommendations can be made about the training of the students if required on this subject.

The purpose of this study was to evaluate the knowledge, awareness and attitude of the medical students regarding proper use of personal protective equipment during pandemics like COVID-19 and other emerging infections that require the use of PPE such as masks, face shields gloves and gowns so that recommendations can be made if needed about training of medical students on this subject.

The objectives were to assess the knowledge about PPE among medical college students, to determine the attitudes regarding hygienic and personal protective practices and to evaluate the factors associated with the knowledge regarding use of PPE among medical college students.

## METHODOLOGY

A descriptive cross sectional study was conducted in Foundation University Medical College, Islamabad using non-probability consecutive sampling, from March to May 2021 among undergraduate students of FFH, 1st to 5th year MBBS. The computed sample size was 260 undergraduate students using WHO sample size calculator and 50% expected prevalence, 95% confidence interval and 5% margin of error and total population of 800 students (total MBBS students). The final size was 289 undergraduate students by adding 10 % non-response rate.

The data will be collected through an online self-developed questionnaire.

It has three sections:

Section-A: Demographic profile of the respondents

Section-B: Knowledge towards use of Personal protective equipment

Section-C: Attitude towards use of Personal protective equipment

**Inclusion Criteria:** Undergraduate students of 1st to 5th year MBBS, students who were willing to fill the questionnaire and students who had internet access were included in the study.

**Exclusion Criteria:** Students of BDS and DPT departments of FUI and students who did not give consent were excluded.

Data will be collected in the Foundation university medical college. A self-administered online question-naire comprising of questions regarding their awareness, knowledge and attitudes towards PPE will be asked from the students. Participants will be well elucidated about informed consent, intervention given, process involved in data collection and its potential risks and benefits. Questions will be asked about their awareness of the types of PPE and its correct use.

The collected data was entered and analyze in SPSS-20. Frequencies and percentages were computed, descriptive statistical analysis was done. Chi-square was applied for association. Results were presented in the form of text, frequency tables and pie charts.

The data from filled questionnaires will be collected then assessed.

Ethical approval was obtained from the ERC of FUI. Ethical considerations were followed according to the recommendations of ethical review board, including informed consent for a voluntary unpaid participation in survey while ensuring confidentiality and privacy of their response.

## RESULTS

Out of 289 respondents, one hundred and sixty eight (58%) belongs to 1st to 3rd year of MBBS and one hundred and twenty one (42%) were in 4th and final year (Figure-1).

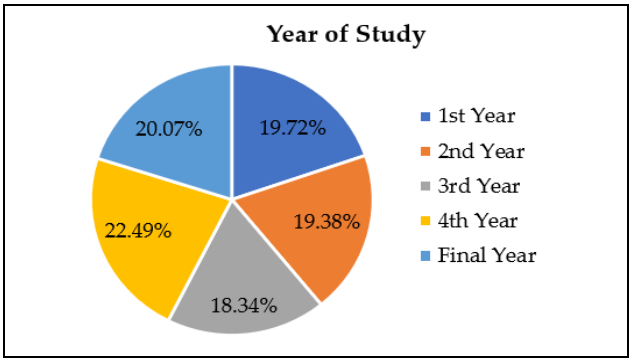


**Figure-1: Year of the study of the respondents.**

Out of 289 respondents, one hundred and ninety seven (68%) were females and ninety two (32%) males (Figure-2).

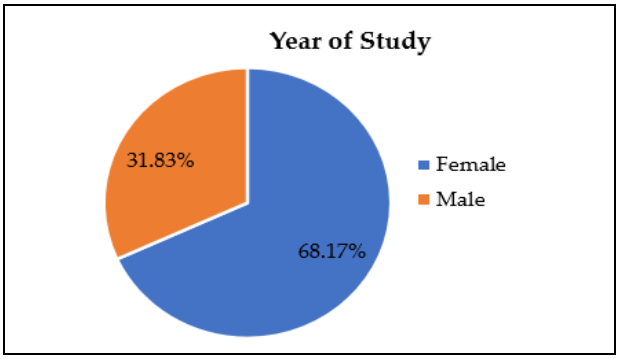


**Figure-2: Gender profile of the respondents.**

Out of 289 respondents, two hundred and seventy one (93%) of them had correct knowledge regarding purpose of hand washing. Two hudred and twenty nine (79%) of them had know-ledge regarding correct duration of hand washing and ninety eight (34%) agreed that use of gloves replaced the need of hand washing. About two hunderd and twenty four (78%) had knowledge that hand washing is indicated after remo-val of gloves (Table-I).

**Table-I: Knowledge regarding hand washing among students.**

| Variables | n | % |
|---|---|---|
| **Hand washing minimizes micro-organisms acquired on hands** | | |
| Yes | 271 | 93 |
| No | 10 | 4 |
| Don't know | 8 | 3 |
| **Minimum period of hand washing** | | |
| 20 seconds | 229 | 79 |
| 40 seconds | 23 | 8 |
| 60 seconds | 37 | 12 |
| **Hand washing is indicated after the removal of gloves** | | |
| Yes | 140 | 48 |
| No | 112 | 39 |
| Don't know | 37 | 13 |
| **Hand washing is indicated between the task and procedure on the same patient** | | |
| Yes | 147 | 51 |
| No | 111 | 38 |
| Don't know | 31 | 10 |
| **Use of gloves replace the need of hand washing** | | |
| Yes | 98 | 34 |
| No | 177 | 61 |
| Don't know | 14 | 4 |
| **Hand washing is indicated after the removal of gloves** | | |
| Yes | 224 | 78 |
| No | 44 | 15 |
| Don't know | 21 | 7 |

Majority two hundred and sixty six (92%) knows that PPE pro-vides barrier against infection. More than half two hundred and twenty four (76%) of them knows that masks and gloves should be changed during procedures. About one hudred and fifty three (53%) and one hundred and forty (48%) had correct knowlded rearding donning and doffing of PPE respectively (Table-II).

Regarding attitudes, half of the respondent (50%) strongly agrees towrds correct use of PPE and hand hygiene. Slightly more than half (55%) of the respon-dents agrees that donning and doffing should be done in proper order. About one hundred and seventy six (62%) of the respon-dent have correct knowledge and disagrees that one should not go out of the ward while wearing PPE (Table-III).

## DISCUSSION

The current COVID-19 pandemic has led to a greater use of PPE among healthcare workers than previously, and identified a need for more training in PPE skills.[13] The knowledge deficit identified in this study line up with that of Peres *et al*,[14] in which it is found that among medical students and junior doctors, 59% of respondents had inadequate knowledge about PPE. Potential self-contamination, due to errors in PPE doffing, has been confirmed in a number of studies which can lead to the transmission of pathogenic mic-roorganisms not only in clinicians themselves but also to the environment and patients.[15,16] The current COVID-19 outbreak has emphasized on the signifi-cance of right PPE use to protect frontline workers and it is only possible if proper training is usage of PPE is done during clinical rotation of medical students.

**Table-II: Knowledge regarding PPE among medical students.**

| Variables | Yes | No | Don't know |
|---|---|---|---|
| PPE provides barrier against infection | 266 (92%) | 13(5%) | 10 (3%) |
| PPE should be only used whenever there is contact with blood | 61 (21%) | 206 (71%) | 22 (8%) |
| Gloves and masks can be reused after proper cleaning | 91 (32%) | 159 (55%) | 39 (13%) |
| Used PPE are to be discarded through disposal | 207 (72%) | 55 (19%) | 27 (9%) |
| Masks and gloves should be changed between different procedures | 224 (76%) | 41 (14%) | 24 (8%) |
| Masks and gloves can be reused if dealing with same patient | 140 (48%) | 109 (37%) | 40 (14%) |
| Correct order of donning: gown, mask, goggles, gloves | 153 (53%) | 62 (21%) | 74 (26%) |
| Correct order of doffing: Gloves, gown, goggle, mask | 140 (48%) | 74 (25%) | 75 (26%) |

**Table-III: Attitudes of the students towards PPE.**

| Variables | Strongly Agree (%) | Agree (%) | Disagree (%) | Strongly Disagree (%) |
|---|---|---|---|---|
| Wash hands or use hand rubs before donning | 173 (63) | 108 (37) | 5 (2) | 3 (1) |
| Donning should be done outside the ward | 124 (43) | 129 (45) | 33 (11) | 3 (1) |
| Gloves should be changed between procedure | 110 (38) | 108 (37) | 65 (23) | 6 (2) |
| Sanitize hands after removing the gloves | 133 (46) | 135 (47) | 16 (6) | 5 (2) |
| Goggles and masks should be touched during the work | 37 (13) | 45 (16) | 110 (38) | 97 (34) |
| Can go out of the ward while wearing PPE | 36 (13) | 77 (27) | 120 (42) | 56 (20) |
| Donning and doffing should be done in proper order | 160 (55) | 118 (41) | 8 (3) | 3 (1) |

In our study, 83.7% students knew that main goal of infection control is to prevent infection in both patients and healthcare workers. This is in line with another study conducted in Riyadh states that 97% students knew the same.[17]

The average knowledge of medical students about PPE in this study was 92% while according to a study conducted in India 77.5% had the knowledge about proper use of PPE.[18] Similarly in another study conducted in UAE the average knowledge of nurses and young doctors about PPE was 76.95%.[19]

This study revealed that 93% of the students knew that Hand washing minimizes microorganisms acquired on hands. This finding is similar to a study among Chinese students in which 99.6% students knew the proper hand washing procedure.[21]

About half of the students (51%) had knowledge that hand washing is indicated between task and procedure on the same patients. Similarly, in another study conducted among Chinese medical students states that 58.5% of students did not wash their hands between two different procedures on the same patients.[21]

In our study, 78% students knew that hand washing is indicated after the removal of gloves while in another study conducted in China found out that 78.3% medical students washed their hands before and after touching wounds when they used gloves.[21]

This study shows that 48% students think that alcohol hand rub substitutes for hand washing while in another study conducted in China 77% students think the same.[21] Similarly another study conducted in UAE among nurses indicates that 79.2% of the nurses think that wearing PPE can be a substitute for personal hygiene such as hand-washing.[19]

In our study 79% students knew that minimum period for hand washing is 20 seconds. While in another study conducted in Riyadh states that 10.1% of the students knew the correct period of hand washing. [17]

More than half (61%) of the students know that use of gloves does not replace the need of hand washing. In a study conducted in Saudi Arabia indicates that 90.9% knew the right answer.[17]

In our study, 69% students knew the correct order of donning of PPE. In another study conducted in Ohio Medical School only 39% selected correct donning and doffing sequence.[20] In our study, 71% students knew that PPE should not only be used whenever there is contact with blood. In a study conducted in Riyadh it was found that 79.8% students knew the correct answer.[11]

In our study 92% students think that gloves and masks can be reused after proper cleaning which is incorrect, whereas in another study conducted in King Saud Bin Abdul Aziz University for Health Sciences found that 90%of students knew that gloves and masks cannot be reused even after proper cleaning.[17]

In this study there was also insufficient knowledge regarding protective masks, which protect clinical staff from infections transmitted via respiratory droplets and this is in line with a study held in Australia the knowledge related to masks were also deficit.[22]

According to our study 48% students knew the right order of doffing PPE while another study in UAE states that 72% knew the correct order.[3]

Our study tells that 76% students think that gloves should be changed between different procedures in same patient. Another study conducted among medical students of Saudi Arabia states that 70% students knew the right answer.[1]

According to our study only 34% of the participants had right knowledge about correct use of goggles and this is similar to a study held in Chicago in which majority of the participants rarely used goggles, safety glasses or visors and several mistakenly believed that their own glasses would protect their eyes from splash.[19]

## CONCLUSION

This study shows that the levels of self-reported PPE information and Infection prevention and control training are sub-optimal in medical students of FFH which significantly correlates to COVID-19-related anxiety.

It is paramount that medical students currently in, and returning to, the workplace are fully proficient with respect to PPE and IPC. There is a need to deliver rapid training, adapted to current circumstances, to better prepare medical students and avoid further transmission of the virus to patients and healthcare professionals.

**Conflict of Interest:** None.

**Author's Contribution**

RA: Discussion, data analysis, manuscript writing, NA: Discussion, methodology, FARM: Data analysis, manuscript writing, MR: Data analysis, Discussion, MR: Introduction, methodology, SZ: Data collection, data entry, AHK: Data entry, data analysis.

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